Title:
Road slope disasters caused by snowmelt in snowy cold regions and snowmelt estimation method for traffic restriction

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Abstract:
Snowmelt water causes road slope disasters in cold and snowy regions, such as Hokkaido. The current traffic restriction is regulated by the amount of rainfall, but it is not fully effective for slope disasters caused by snowmelt. Therefore, a new standard, based on amounts of both rainwater and snowmelt water is required for preventing slope disasters in snowmelt season. Therefore, it is necessary to develop a snowmelt estimation method that calculate snowmelt distribution around road. This study investigates an estimation method of snowmelt distribution based on the improved degree-hour method. The improved degree-hour method estimates amount of snowmelt water from the product of the snowmelt water coefficient and the time-cumulated temperature. The snowmelt water coefficient and the time-cumulated temperature were calculated in 12 points along a national road in the suburb of Sapporo. Those values were different at each point because of the geographical feature and climate condition. The snowmelt is affected by solar radiation even when the snowmelt water coefficient is the same. The snowmelt water coefficients in all points within the study area were estimated from the regression line that represents the relationship between the analyzed amount of solar radiation and the coefficient obtained from 12 points with the geographic information system (GIS). The time-cumulated temperature is considered to become lower as the altitude becomes higher because the temperature becomes lower as the altitude becomes higher, judging from the temperature lapse rate. Therefore, the time-cumulated temperatures in all points within the study area were estimated from the regression line that represents the relationship between altitude and the time-cumulated temperature. The snowmelt distribution in the study area is calculated from both the snowmelt water coefficients and the time-cumulated temperatures in all point on the GIS, based on the improved degree-hour method.